COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

December 30, 2004

The Honorable Michael O. Leavitt
Air Docket
Clean Air Mercury Rule
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Attention: Docket ID No. OAR-2002-0056

Re: Comments on Proposed Mercury Rule

Dear Administrator Leavitt:

The Massachusetts (MA) Department of Environmental Protection (DEP) appreciates the opportunity to further comment on the U.S. Environmental Protection Agency's (EPA) proposed mercury rulemaking, as noticed in the Federal Register on December 1, 2004 (69 FR 69864), entitled *Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources, Electric Utility Steam Generating Units: Notice of Data Availability.* Key MA comments are summarized below and presented in more detail in the attached materials.

Mercury is a major environmental priority for Massachusetts and the New England region where mercury pollution is adversely impacting important resources. Of particular concern is the fact that mercury can cause brain damage in growing children, and during neurological development before birth.

EPA has solicited comment on the modeling analyses performed by previous commenters, including the inputs and assumptions underlying those analyses. As you are aware from our previous comments, Massachusetts DEP has concluded that much greater reductions in mercury emissions from utilities are technologically and economically achievable compared to the EPA Utility Mercury Reduction proposals advanced to date. These conclusions are based on a recent study completed by the Massachusetts DEP demonstrating that more aggressive mercury reductions are technologically feasible and cost effective. As a result, Massachusetts promulgated regulations that require mercury emission reductions from large Massachusetts's coal-fired power plants that exceed those under the current EPA proposals. The Massachusetts regulations contain tough, achievable standards that can be implemented throughout the United States. Greater emission reductions and tighter timeframes for compliance at the national level are supported by the data and are needed to better protect the health of our children, public health overall and the environment.

We strongly urge EPA to reconsider the proposals and to regulate mercury under Section 112, using more stringent Maximum Achievable Control Technology (MACT) limits that are based on the actual observed mercury emissions of the best performing 12% of facilities. This is achievable and will result in greater reductions of mercury emissions and other benefits.

Our major comments on the NODA, which are outlined in further detail in Attachment A, are:

- We believe EPA should model emission reduction factors for an existing, readily available control option: low NOx burners installed in concert with electrostatic precipitators, with the combination optimized to control mercury. We have attached results of test runs performed at each of Massachusetts 8 oldest and largest coal-fired units. The test results show that greater than 85% of mercury can be captured using existing control technology.

- We are concerned that the modeling of electric industry control strategies narrowly assumes that facilities burn only bituminous, subbituminous or lignite coal. EPA has not taken into account the increased mercury capture that can be achieved when co-firing a small fraction of bituminous with subbituminous coal. Modeling should account for the control that can be achieved through modest coal blending, rather than implying that the only possible fuel modification is wholesale fuel switching, which artificially constrains the options available to facilities and increases costs.

- Activated Carbon Injection (ACI) control technology is available now. The air pollution control industry has indicated that they have "the technology and the resources to readily achieve the … mercury reductions in the time frames contemplated." Therefore, EPA should finalize strict MACT standards with real deadlines, including ACI as a possible control choice.

- The proposed mercury emission trading program Phase 1 cap is assumed to equal the co-benefit level of NOx and SO2 controls and is much too high. This will allow excess banking and thus substantially delay achieving the final Phase 2 goals. Massachusetts strongly urges EPA to abandon the trading approach.

Massachusetts is committed to improving air quality and minimizing impacts on downwind states by implementing new regulations and credible compliance and enforcement initiatives. EPA should adopt standards similar to Massachusetts' through the federal MACT process.

Thank your consideration of these comments. I look forward to working with EPA as we continue to address mercury pollution in our efforts to achieve local and regional air quality improvements in a timely manner.

Sincerely,

Robert W. Golledge, Jr.
Commissioner

Cc: Secretary Ellen Roy Herzfelder
Robert W. Varney, EPA Regional Administrator

Enclosures

Attachment A

Massachusetts Department of Environmental Protection
Technical Comments on Mercury NODA

Docket ID No. OAR-2002-0056

Additional Comments

The Massachusetts Department of Environmental Protection (DEP) agrees with the comments on the Mercury Notice of Data Availability (NODA) submitted by the Northeast States for Coordinated Air Use Management (NESCAUM) and the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO).

DEP strongly believes that EPA's proposals must be more stringent with respect to timing (in the case of the 111 proposal) and cap levels. DEP therefore urges EPA to adopt mercury cap levels and reduction timeframes in the ranges that have been proposed by the Ozone Transport Commission in its January 27, 2004 *Multi-Pollutant Strategy Position of the Ozone Transport Commission*, and by STAPPA/ALAPCO's May 7, 2002 *Principles for a Multi-Pollutant Strategy for Power Plants* and March 12, 2004 analysis of those principles.

Responses to the three major issues on which EPA is soliciting comment follow.

Electric Utility Sector Modeling

The summaries of the modeling results presented by EPA are not transparent. Although EPA states that the NODA "summarizes the modeling analyses performed by commenters and solicits comment on the inputs and assumptions underlying those analyses," the NODA lacks detail that could allow commenters to evaluate whether or not the models are accurate. In order to provide EPA with the comment it claims to desire, the assumptions need to be clearly articulated so commenters can determine whether and why the model results are or are not reasonable. The modeling summaries do not include sensitivity analysis results showing the possible range of outcomes, indicating which parameters the models are most sensitive to and the extent of such sensitivity. Based on the limited explanation EPA has presented of the important assumptions, we have the following comments.

The basis of the low co-benefit mercury reduction estimates derived from some of the modeling exercises (e.g., Cinergy, EEI) is unclear and inconsistent with available information.

Substantially greater control of mercury emissions is already being achieved with existing air pollution control devices, even without optimization for mercury control, than the models appear to assume. The ability of activated carbon injection (ACI) and other control approaches (e.g., fuel and combustion modifications to modulate speciation) to achieve even greater control across a range of coal types is also discounted. As a result, achievable mercury reductions are underestimated and costs overestimated. For example, in light of the substantial mercury reductions that are achievable with current controls targeting other pollutants as well as the *current* availability of ACI (in contrast to Cinergy's assumption that ACI would not be available until 2010) Cinergy's prediction that subbituminous fueled facilities would need to shut down for 2 years in order to comply with the proposed emission limits is not credible. This is a deeply flawed analysis with unrealistically pessimistic assumptions and should be discounted.

Responses to specific modeling issues raised by EPA follow.

a. In some of EEI's analyses, EEI assumed a 2.5 percent annual improvement in variable operating costs for ACI. Is it appropriate for an economic forecast to assume an improvement in costs over time (such as through technology cost reductions or through future technology innovation), and, if yes, what level of improvement in costs should be assumed?

Improvements in variable operating costs of ACI and other technologies are to be expected and should be included in the models. Improvements in emission reductions attributable to existing controls will also occur over time and should also be factored into the analyses. Advances in control technologies and management practices will also reduce capital expenditures. These should be considered as well.

b. Due to model size considerations, limited knowledge on achievable levels of Hg control, and limited knowledge on assessing the full impact of the Hg speciation profile on control, IPM has limited Hg control retrofit options. Currently, IPM assumes that Hg reductions are achieved only through use of SCR and FGD or ACI (with or without fabric filter). (EPA notes that Hg reductions in IPM can also be achieved through fuel switching, dispatch changes, and retirements.) Should other control options be considered in EPA's power sector modeling (e.g., retrofit of fabric filters and electrostatic precipitators, pre-combustion controls, and the optimization of SO2 or NOX controls)?

The EPA should consider additional control technologies including stand-alone fabric filters (i.e., without associated ACI); low NOx burners in conjunction with ESP; pre-combustion controls; large-size ESPs in conjunction with ACI; and the optimization of SO2 and NOx controls. Restricted consideration of controls artificially limits the options available to facilities and thus inflates control costs.

Low NOx burners and ESP have been found to capture >85% of mercury at Massachusetts coal-fired units. We have attached results of 9 test runs performed at each of Massachusetts 8 oldest and largest coal-fired units. These mercury emissions test results show that greater than 85% of mercury can be captured using existing control technology. As stated in our original comments,

> One mercury control technology, which EPA has not adequately considered, is the use of low-NOx burners. The SNPR (69 FR 12402) states, "It has long been observed that poorly tuned coal boilers generate higher levels of unburned carbon in coal ash than properly tuned boilers [which] can function like activated carbon injection and adsorb Hg emissions….Pilot-scale tests have been very promising." As EPA is well aware, low-NOx burners result in higher levels of unburned carbon in coal ash, and low-NOx burners are a mature technology required in the Northeast for years to achieve the limits of NOx RACT. In Massachusetts, units at Salem Harbor and Mt. Tom Stations are averaging 83 to 87% capture of mercury in coal through the use of low-NOx burners and electrostatic precipitators. Thus, EPA should not characterize low-NOx burners as "poor tuning" and should recognize the possible role of low-NOx burners in helping to reduce mercury emissions.

and further,

> Salem Harbor's 90% mercury removal is portrayed as unusual ("particulate fraction of mercury is extremely high and is well beyond normally observed levels"), yet Massachusetts has other units with similar particulate-bound mercury fractions).

In addition, units at Massachusetts' Brayton Point Station have particularly large ESPs, that when used with ACI, were found to achieve high levels of mercury capture. The use of the mature control technology of ESP, in conjunction with ACI, should be modeled in EPA's analyses.

c. To the extent commenters believe that control considerations other than those noted in the proposal or in the preceding paragraphs should be included in power sector modeling, EPA is seeking data on the timeline for commercialization, cost, balance of plant issues, and performance of such control options.

Low NOx burners; fuel modifications to modulate mercury speciation (such as co-firing a small fraction of bituminous with subbituminous coal, which can increase mercury capture, rather than wholesale fuel switching), etc. should be considered and are available now. See previous comment and attached Massachusetts test results. DEP recommends including an optimized Low NOx burner/ESP control configuration, which has been shown to achieve >85% mercury capture in Massachusetts units.

d. CATF and Cinergy both modeled more stringent MACT-type options. However, CATF assumed that ACI would be available in 2005 for all coal types, while Cinergy assumed that ACI would be available in 2010 for all coal types for one MACT scenario modeled. (EPA notes that for Cinergy's other modeled scenarios, including a MACT scenario, it assumed ACI would be available in 2005.) The year of availability for ACI is an assumption that appears to have made a large difference in the projected impacts of a MACT-type option. … What assumptions for ACI availability are most appropriate? Specifically, what date of availability for ACI technology is appropriate to consider in a modeling analysis, at what quantities, for what coal types, and why?

ACI is available now. Municipal waste combustors (MWCs) have used ACI for years and given us experience with the operation and installation of the equipment, including activated carbon storage silos and blowers. With the market certainty that a firm regulatory deadline would provide, availability is simply not an issue. In addition, EPA received testimony from the Institute of Clean Air Companies in February 2004 that "The air pollution control industry has both the technology and the resources to readily achieve the PM2.5, NOx, SO2 and mercury reductions in the time frames contemplated by both the Interstate Air Quality Rule and mercury control under Section 112 of the Clean Air Act." There is no reason not to consider ACI to be available now, and to finalize strict but achievable MACT standards.

e. EEI estimated that ACI would be less expensive per pound of Hg removed than EPA has estimated. In addition, Cinergy assumed higher capital costs for ACI than EPA in its modeled scenarios. Are EPA's Hg control technology cost assumptions reasonable? Although EPA has information on the costs of ACI, EPA is seeking additional detailed data addressing the validity of the costs assumed for ACI.

Although EPA has stated that it is releasing this NODA to summarize issues due to the large number of comments received, the NODA does not actually provide the costs that EPA is seeking comment on, making it difficult to provide comment.

f. Analyses by commenters and EPA of Hg trading programs indicate that variations in the first phase cap level and timing impact when the final cap level will be achieved (i.e., the emissions reduction ''glide path''). Although banking in the first phase impacts the timing of achieving the second phase cap, it should not affect the cumulative Hg emissions reductions ultimately achieved under the program. EPA is seeking additional comment on the impact banking may have on the timing of achieving the second phase cap.

The impact of banking Phase 1 emission credits on achieving Phase 2 limits is largely dependent on the level of the Phase 1 cap. As proposed, the Phase 1 cap is assumed to equal the co-benefit level of NOx and SO2 controls and is much too high, which will allow excess banking and thus substantially delay achieving the final Phase 2 goals.

g. EPA received comments estimating the co-benefits of Hg reductions associated with implementation of the proposed CAIR (i.e., the level of Hg reductions realized as a result of compliance with the proposed CAIR). Cinergy estimates a co-benefit level in 2010 of 38 tons as compared to current emissions of 48 tons. EEI estimates a cobenefit level in 2010 of 40 tons. Both groups modeled a 34-ton first phase cap. In light of these modeling analyses, EPA is seeking additional comment on the reasonableness of its current

IPM assumptions co-benefit reductions. Emission modification factors (EMF) are one component of the estimated Hg cobenefits from the proposed CAIR. A comparison of co-benefit assumptions used in EPA and other modeling is provided in Table 5. We are also seeking comment on appropriate EMF.

As noted in our original comments, DEP does not believe it is legally appropriate to base mercury MACT standards on co-benefits. However, if EPA wishes to accurately predict the co-benefits from CAIR, it would be more precise to model an optimized low NOx burner/ESP control combination, as Massachusetts has seen control efficiency >85% due to this combination (see attached Massachusetts test results).

The emission modification factors (EMFs) of existing, installed air pollution control devices should reflect optimization of the controls to achieve improved mercury reductions as well as the potential to improve mercury capture by these controls through fuel modifications. The EMFs should therefore be based on a measure of the *best* performing units within each class. Estimates of the levels of mercury control that can ultimately be achieved with existing air pollution control devices targeting other pollutants should be based on the *best* performing configurations overall.

h. …EPA is considering revising the EMF for subbituminous coal-fired units equipped with SCR and wet FGD in modeling for the final rule. … EPA is seeking comment on these proposed EMF changes. In addition, EPA notes that other recent test data … may be available that would influence EMF used in EPA modeling. EPA is seeking comment on the appropriateness of using other test data for EMF development and requests that commenters submit any test data that may be relevant.

In general, modeled control efficiency should be based on observed data. However, EPA's EMFs are listed only for bituminous, subbituminous and lignite coals, and do not take into account the increased mercury capture that can be achieved when co-firing a small fraction of bituminous with subbituminous coal. The model should account for the control that can be achieved through coal blending, rather than implying that the only possible fuel change is wholesale fuel switching.

We have attached Massachusetts test results for bituminous-fired units, so that EPA can add a control configuration for optimized low NOx burners in conjunction with ESP.

Issues of Hg Speciation

a. We have received numerous comments on subcategorization by coal type and the speciation profiles resulting from the combustion of various coal types. We are seeking additional specific data and information on the speciation profiles of various types and blends of fuels.

We have attached speciated Massachusetts test results from 9 test runs performed at each of Massachusetts 8 oldest and largest coal-fired units.

b. Commenters have questioned the appropriateness of using a standard (or average) speciation profile in modeling analyses conducted for all coal-fired power plants. The Agency is seeking comment on if/when a standard (or average) speciation profile should be used for either the CAA section 111 or CAA section 112 regulatory approach.

Although the chemical speciation of mercury impacts its capture by Air Pollution Control Devices and thus has important implications with respect to control strategies at specific plants, its ultimate impact on overall control costs and efficiency may not be that significant. Available controls can address all types of mercury species. Additionally, mercury speciation is a function of factors that can be manipulated as part of any control strategy including relatively minor adjustments to fuel composition, modifications to combustion conditions, etc. These observations are particularly relevant with respect to sub-

categorization by coal type, which may make some sense for co-benefit analyses of the control effectiveness of currently installed devices but is not justified with respect to the ultimate emission standards where mercury-specific control strategies can be employed. Similar and very substantial (i.e., 90+%) levels of mercury control can be achieved for both bituminous and subbituminous coals.

EPA's Proposed Revised Benefits Assessment

The approach delineated will underestimate benefits and will yield results with a very large but unquantifiable degree of uncertainty. A better approach might be to assess the issue using a willingness to pay (WTP) approach to gauge the integrated valuation the public places on protecting children's health, fisheries resources and wildlife.

It is important that *all* benefits be included in the analysis - not just human health impacts. Economic impacts on recreational fisheries; commercial fisheries; and important wildlife ecosystem species such as loons and other birds should be addressed.

The benefits of controls achieving reductions of multiple pollutants should be assessed and costs not apportioned solely to mercury.

Uncertainties should be clearly discussed including those relating to all the models used; monetization uncertainty etc. Sensitivity analyses should be included for each step in the process. Benefit estimates should be presented as robust ranges.

IQ is only one endpoint of concern. In light of the multiple effects of mercury, benefit estimates based solely on IQ will therefore be a gross underestimate.

IQ benefits should not be based solely on lost earnings. A WTP approach is a better way to reflect societal and parental valuation of impacts attributable to developmental neurotoxins.

Mercury's IQ impacts will shift the IQ distribution in the population downward resulting in increased numbers of impaired individuals in the lower portion of the distribution and reduced numbers of higher IQ individuals at the upper end of the distribution. The benefits of avoided costs associated with increased numbers of "impaired" individuals should be assessed. These should include a full accounting of costs on communities, families and individuals not just costs of care and reduced earnings potential. On the other end of the spectrum, the costs to society associated with the loss of contributions attributable to the decreased fraction of gifted individuals in the population should also be addressed. These will be difficult if not impossible to estimate but are likely to be very significant.

The available science is still very uncertain regarding the estimation of reductions in exposures to mercury attributable to source specific reductions in emissions. These uncertainties need to be fully addressed.

Responses on the specific steps proposed to evaluate the benefits of mercury reduction follow.

Step1: *Analyzing Hg Emissions from Other Sources*. International sources are important; hence, there is a real need for an aggressive binding global mercury action plan. Strong US regulations would drive global reductions of utility sources that ultimately impact the US and would improve the global competitiveness of US companies in the pollution control arena. As noted below, significant local and near field impacts of point sources have been demonstrated. We are concerned that the existence of international sources of mercury emissions will be used to justify doing little in the US, on the grounds that reductions can be achieved more cheaply in other countries, or that US emissions are only a piece of the problem. Such an outcome would not achieve progress to final MACT standards, which are required by the Clean Air Act to

be based on the available technology, not on the reduction cost in other countries or on whether there are also emissions from other countries.

Step 2: *Analyzing Air Dispersion Modeling Capabilities*. The Mercury Deposition Network (MDN) on mercury deposition provides the best data available, but is woefully inadequate and does not provide a sufficient basis to evaluate deposition model accuracy with respect to near and intermediate field mercury deposition from point sources like power plants. The network does not measure dry deposition, which increasing evidence indicates is an important contributor to total deposition, and the monitoring locations are such that they reflect background levels, not point source impacts. The MDN data therefore cannot validate deposition models near point sources.

Step 3: *Modeling Ecosystem Dynamics*. Results from Florida and the METTALICUS study as well as preliminary results from studies on fish in MA and loons in the northeast indicate that substantial reductions in biotic mercury levels can result from reductions in mercury emissions from local point sources over fairly short time frames. It is unclear whether the modeling approach proposed will reflect or reproduce these observations. These observations also indicate the importance and effectiveness of addressing local point sources.

Step 4: *Fish Consumption and Human Exposure*. It is important to make sure that local differences in exposures attributable to fish consumption are adequately specified in the analysis, rather than using a national average fish consumption level. Distributional analyses should ensure that the full range of exposures are included.

Step 5: *How Will Reductions in Population-level Exposure Improve Public Health?* DEP recommends not pooling data from the Faroe Islands, New Zealand and Seychelles Islands studies. As suggested by the National Academy of Sciences (NAS), data from the Faroe Islands study is the preferable basis for analysis of the effects of mercury on children.

Conclusion

The discussion of factors considered in the analysis of whether beyond the floor standards should be adopted ignores the most important issue, which is the inappropriate methodology used by EPA to establish the MACT floor in the first place, which resulted in a floor that is *much* higher than justified (see comments previously submitted by DEP).

The overall approach to evaluating control efficiency, costs and benefits relies heavily on layer after layer of highly uncertain models that are complex, not transparent, and sensitive to changes in assumptions. The overall uncertainty in outputs attributable to the multiple sources of uncertainty and the propagation of errors through the modeling exercises attributable to this uncertainty will be very large but is not quantifiable. What we do know for certain is that: mercury is very toxic, mercury bioaccumulates and persists; exposures to mercury in a significant fraction of the population exceed health based limits; there is too much mercury in fish across the US; our country's most important resource - our children - is at risk; coal-fired power plants are the largest source of mercury emissions; effective controls exist that can be implemented at costs comparable to or even less than those incurred for other pollutants. In light of these firmly established facts and the considerable scientific uncertainty in the available modeling approaches, Massachusetts and many other states have adopted a precautionary approach to mercury pollution. We urge EPA to do the same.